UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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OFFICE OF
ENFORCEMENT AND
COMPLIANCE ASSURANCE

Docket Management Facility, M-30
U.S. Department of Transportation, West Building
Ground Floor, Room W12-140
1200 New Jersey Avenue, SE
Washington, DC 20590

**RE: Final Environmental Impact Statement for New Corporate Average Fuel Economy Standards, Passenger Cars and Light Trucks, MY 2011-2015, Docket Number NHTSA-2008-0060**

To Whom It May Concern,

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the Environmental Protection Agency has reviewed the National Highway Traffic Safety Administration's (NHTSA) Final Environmental Impact Statement (FEIS) for Corporate Average Fuel Economy (CAFE) Standards. In this FEIS, NHTSA considers the potential environmental impacts of new fuel economy standards that NHTSA is proposing pursuant to the Energy Independence and Security Act of 2007 for model year 2011-2015 passenger cars and light trucks.

For the purposes of the FEIS, NHTSA has evaluated a "No Action" alternative, an "Optimized" alternative, representing the proposed CAFE standard by which net benefits are maximized given a certain range of assumptions and further representing NHTSA's preferred alternative, and five other alternatives ranging from less stringent to more stringent than the "optimized" alternative. NHTSA further evaluates each of the aforementioned alternatives under four "scenarios", each representing a different set of economic assumptions, and therefore, inputs into the Volpe model used.

EPA appreciates the wide range of alternatives analyzed and particularly acknowledges the willingness of NHTSA to present the results representing different model input scenarios. However, EPA notes that there are a large number of additional inputs to the Volpe model which are based on information that is not fully presented and, therefore, not reviewable. Critical to the review are: new manufacturer product plans, the inputs and outputs from the Volpe model runs used for the FEIS, confidential comments submitted in response to NHTSA's CAFE NPRM which have been utilized by NHTSA in the FEIS analysis, and details regarding the fuel economy improvement technology costs and effectiveness. Lacking this data, it is difficult to substantiate the alternative scenarios presented in the FEIS.

Finally, it is clear from the information presented that the "optimized" alternative is quite sensitive to the inputs provided to the Volpe model. As NHTSA does not specify a particular input scenario to be most appropriate in setting the CAFE standard, it is difficult to determine with a substantial degree of accuracy precisely what standard is being proposed. Based on the information presented in the FEIS, EPA believes that the fuel prices used in the "high scenario" are the most appropriate and, therefore, recommends that they be the basis for the final CAFE standards. EPA also believes that the global value for the social cost of carbon in this scenario is preferable to the domestic value used in other scenarios.

EPA remains supportive of the effort to raise fuel economy standards and believes that NHTSA's proposed action would result in environmental benefits. However, we continue to have concerns with the limited information on technical assumptions and inputs upon which the FEIS is based. Our detailed comments are attached.

We appreciate the opportunity to review and provide comment on the FEIS and are prepared to provide assistance to NHTSA on both this action and future CAFE regulatory actions. If you have any questions, please contact me at 202-564-5400 or James G. Gavin at 202-564-7161

Sincerely,

for Susan E. Bromm
Director
Office of Federal Activities

Enclosure

## **Detailed Comments**

### ***Support for "High Scenario"***

In the FEIS, NHTSA included a High Scenario that projects CAFE standards based on a higher social cost of carbon ($33.00 global vs. $2.00 domestic Reference Case), higher projected fuel prices ($3.33 vs. $2.41 Reference Case), and a lower discount rate (3% vs. 3%/7% Reference Case). EPA is pleased that NHTSA included this High Scenario and believes the inputs represented are directionally more appropriate than the Reference Case (as detailed in our comments on the DEIS and summarized below).

We understand that future fuel price projections have a first-order impact in NHTSA's methodology for determining the stringency of the CAFE standards. Many experts believe that world oil prices will rise in concert with the global economic recovery, and EPA believes the fuel prices used in the High Scenario should be used as the basis for the final CAFE standards.

NHTSA's FEIS includes scenarios using both a 7% (Reference Case) and a 3% (High Scenario) discount rate to discount intra-generational future costs and benefits in determining the "optimized" fuel economy standard. With respect to intergenerational discount rates, our recommendations regarding the discount rate appropriate for the social cost of carbon are discussed in a later section. EPA recommends that NHTSA use a 3% discount rate for the societal benefits included in the analysis when NHTSA uses the socially optimized methodology for determining the final CAFE standards. This would include the energy security premium, the benefits from reduced criteria pollutant impacts, and the benefits from reduced traffic noise and congestion. With respect to private benefits such as fuel savings, it is unclear what the appropriate discount rate should be. EPA believes that this issue warrants further study.

This High Scenario illustrates why the assumptions and inputs to the NHTSA Volpe Model analysis are fundamental to determining the CAFE standards – in this case, the input values result in CAFE standards roughly 4 mpg higher than the Reference Case, which would result in substantially higher $CO_2$ emission reductions. Because these High Scenario inputs are directionally more appropriate than those used in the Reference Case, EPA believes they should be given substantial weight in determining the final CAFE standards.

### ***Information Lacking on Model Inputs***

The overall methodology used by NHTSA in setting the CAFE standard relies on the use of a large number of inputs which are based on confidential information that has not been made available for EPA to review. Critical to the review are: new manufacturer product plans; the inputs and outputs from the Volpe model runs used for the final EIS; confidential comments submitted in response to NHTSA's CAFE NPRM which have been utilized by NHTSA in the final EIS analysis; and details regarding the fuel economy improvement technology costs and effectiveness. NHTSA declined to provide EPA with such information. The lack of this information makes it difficult to substantiate the alternative scenarios presented in the FEIS.

In a related matter, NHTSA's methodology relies on evolving versions of the Volpe Model, which requires thousands of inputs to determine the standards that, according to the model, maximize net societal benefits. Updated product plans are the foundation of NHTSA's analysis and the latest version of the Volpe Model is the tool utilized by NHTSA to evaluate the alternative scenarios contained in the final EIS. However, EPA believes that a meaningful evaluation of the alternative analysis presented in the final EIS is not possible without reviewing these items.

The foundation of NHTSA's analysis is the confidential manufacturer product plans. Based on EPA's review of the CAFE NPRM CBI Product Plans, we understand that NHTSA's methodology accepts at face value a manufacturer's projection for the fuel economy benefit of a technology included in that manufacturer's product plan. This is the case even if the projection is much different from the projection for that same technology that NHTSA uses elsewhere in its analysis. By using this methodology an automaker can essentially "neutralize" the ability of NHTSA to take full advantage of this technology in the CAFE standard setting process. The methodology can create incentives for auto companies to add technologies to the baseline projections and to be conservative in their projected fuel efficiency. EPA recommends that NHTSA give adequate scrutiny to manufacturers' plans so that inaccurate projections can be corrected.

Finally, in the FEIS, NHTSA states that it has made significant changes to the costs and effectiveness of fuel efficient technologies, based on both public comments and confidential manufacturer information. NHTSA states, "the agency and its consultant generally agreed with commenters who said that in several cases, the technology related costs used in the NPRM and DEIS were underestimated and benefits were overestimated" (FEIS, p. 2-5). However, EPA cannot fully evaluate the changes, due to the lack of accompanying information and cannot evaluate the basis for a number of the most critical inputs underlying NHTSA's FEIS analysis, including decisions on technology costs, technology effectiveness, technology phase-in rates, technology synergy impacts, and manufacturer learning curve impacts on technology costs

***Social Cost of Carbon***

NHTSA uses a domestic Social Cost of Carbon (SCC) of \$2/t$CO_2$ (in 2007\$ and for emissions in 2007) for the reference case. This value is grown at an annual rate of 2.4% and discounted at 3%. NHTSA also examines alternate values for the SCC, including a global value of \$33/t$CO_2$ and a "global +1 standard deviation" value of \$80/t$CO_2$, both based on Richard Tol's (2008) meta-analysis.

EPA continues to believe that a global benefits value is more appropriate to use than a domestic value in this context and further believes that the rationale for choosing a domestic value on which to base NHTSA's standard is questionable. EPA has explored this issue and requested comment on this matter in the context of its pending GHG ANPR. EPA further believes that NHTSA's calculation of the SCC is incorrect for a number of reasons, including inconsistent discount rates in determining the central tendency, a lower than justified growth rate, and a lack of consideration of lower discount rates. Finally, EPA believes that NHTSA's choice to use a "high" SCC value that is one standard deviation above the mean is unsuitable in this review.

In a related matter, EPA does not believe that the $2/t$CO_2$, which the FEIS characterizes as a domestic benefit, should be used as the single point value for standard setting. Accordingly, we urge NHTSA to move sooner, rather than later, to incorporate the full global value into its standard-setting process. As we have commented previously, OMB guidance allows for the consideration of global benefits in appropriate situations. Given the global nature of climate change, a global SCC value can be viewed as the more appropriate characterization of the contribution of the new CAFE standards in addressing the externality (climate change). A domestic SCC does not account for the full cost associated with U.S. GHG emissions.

NHTSA's primary justification for choosing a domestic value is the theoretical cost associated with unilateral action. NHTSA argues that domestic industry would be disadvantaged in international competition by the increase in fuel economy standards associated with use of the global, compared with domestic, SCC, though it does not present any analysis to support this argument. NHTSA further argues that regulation could cause "spillover" effects, in which heavily polluting industries relocate to jurisdictions with more limited pollution controls. In this particular case it is difficult to conceive of how a spillover would occur, because the CAFE standards apply only to those vehicles driven in the US, and apply equally to vehicles manufactured within or outside the borders of the United States and to both domestic and foreign producers. As more countries adopt policies that address these global externalities, competitiveness is expected to be less of a concern. In any case, the FEIS does not present the results of any analysis that would support their assertion regarding the use of a domestic value.

NHTSA's domestic value is based on a global value that, in turn, is based on a meta-analysis by Dr. Richard Tol (2008). EPA has done a large amount of research on the SCC and has worked extensively, in direct collaboration, with Dr. Tol to develop SCC results that are internally consistent.[1] In the EPA meta-analysis, results were filtered to include only those peer-reviewed estimates that are not equity weighted and separated by discount rates utilized in the original studies. In contrast, NHTSA has preferred to group all of the discount rates together and to treat variation in this factor as a source of uncertainty. EPA believes that, while economic principles can guide our thinking on the range of appropriate discount rates, the choice of a discount rate is a policy variable that has significant impacts on the estimates of SCC. Rather than combining SCC estimates based on many discount rates, it would be more illuminating to do a sensitivity analysis with SCC estimates based on a variety of discount rates. Furthermore, combining

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[1] For background on economic principles and the marginal benefit estimates, see *Technical Support Document on Benefits of Reducing GHG Emissions*, U.S. Environmental Protection Agency, June 12, 2008, www.regulations.gov . Search for ID "EPA-HQ-OAR-2008-0318-0078".

estimates with different discount rates into a single sample is inconsistent with the choice of a single discount rate (3%) to compute NPV GHG benefits. As a result, NHTSA's estimates are not drawn from a consistent sample, which substantially weakens the argument presented by NHTSA that a larger sample size generates a better estimate.[2]

NHTSA chose not to filter out estimates from pre-1995 studies, based again on the argument that a larger sample is better. EPA's rationale for this filter was to account for a fundamental improvement in modeling that accounted for changing socioeconomic conditions (See, for example, Mendelsohn and Williams, 2004).[3] While we appreciate the additional footnote in the preamble to acknowledge how the SCC estimate would change if the various EPA filters were applied, given the many comments suggesting substantial progress both scientifically and in modeling sophistication from the early years of climate modeling, EPA continues to recommend screening the meta-estimates by publication date.

EPA reiterates our previous concerns regarding NHTSA's use of a 2.4% per year growth rate regarding the global SCC value; EPA maintains that the correct formulation of this value was a "2-4%" growth rate (see *Technical Support Document on Benefits of Reducing GHG Emissions*). The 2.4% per year suffers from similar problems as the global estimate NHTSA chose, in that it is an average over estimates with, among other things, different discount rates. The 2.4%/year is based on results from a single model, as noted by NHTSA, raising consistency issues in applying it to a meta-analysis SCC estimate that is based on multiple models. EPA currently recommends using the mean of the 2-4% range reported by the IPCC. This range is also based on a single model, but it represents a broad variation in assumptions that is more akin to the range of assumptions reflected in the meta-analysis.

While NHTSA is to be commended for the use of a lower discount rate that more appropriately represents the consumption tradeoffs inherent in climate change impacts, EPA believes that NHTSA should also consider the very long run investment (100+ years) associated with changes in GHG emissions that imply interest rates below those observed in intra-generational, risk free, consumption rates. For intergenerational analyses, such as the economic analysis of climate change mitigation as reflected in the proposed CAFE standards, EPA recommends that NHTSA consider a sensitivity analysis using a discount rate lower than 3 percent, consistent with OMB (1-3%) and EPA (0.5-3%) guidance.

EPA also questions the use of a "high" sensitivity that is one standard deviation above the mean. Generally, sensitivity analyses are done at the 5$^{th}$ and 95$^{th}$ percentiles (approximately +/- 2 s.d.). This range is particularly important in a case where policy-

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[2] For the EPA meta analysis, the sample sizes were 13 and 10 for consumption discount rates of 2% and 3% respectively. A sample size of 10 or greater is considered sufficient for estimating an extreme value distribution (Carter, D. J. T. and P. G. Challenor, 1983. Application of extreme value analysis to Weibull data, *Quart. J. R. Met. Soc.* 109, 429-433).

[3] Mendelsohn, R. and L. Williams, 2004. Comparing forecasts of the global impacts of climate change. *Mitigation and Adaptation Strategies for Global Change* 9: 315–333.

makers and the public are especially concerned about the more extreme potential impacts associated with climate change (i.e., the fat right tail of the distribution of potential impacts). The distribution of SCC estimates in the literature exhibits a fat right tail, and therefore use of a value at the 95$^{th}$ percentile would be a better representation of the range and distribution of estimates of the SCC and the reasons for concern. Use of the 95$^{th}$ percentile is further justified given that the IPCC clearly notes that current estimates are underestimated with 90% likelihood, since current estimates omit key categories of impacts (IPCC Working Group II Chapter 20, 2007). While we appreciate the additional footnote in the preamble that acknowledges what the SCC estimate would be for the 95$^{th}$ percentile, we continue to recommend including the 95$^{th}$ percentile value directly in the analysis.

Finally, while NHTSA does note the fact that current SCC estimates are likely to be underestimated due to omitted impact categories, they do not substantially incorporate this finding into the determination of which alternative is likely to be economically optimal. It would be informative for NHTSA to discuss how an accounting of this underestimation of the SCC would impact their estimates for the optimal CAFE standards. Although the FEIS acknowledges the omission of a risk premium, however, it is not taken into account in the selection and application of SCC estimates. EPA recommends that NHTSA to reconsider this approach.

***Temperature projections***

NHTSA indicates that it used the IPCC's range of most likely climate sensitivities in its analysis, but used the incorrect range of 2.5-4 degrees C (see S-14). The IPCC most likely climate sensitivity range is actually 2-4.5 degrees C. EPA recommends that NHTSA revise the analysis for its record of decision to reflect that range. We would recommend modeling climate sensitivities of 2 degrees C, 3 degrees C, and 4.5 degrees to analyze low, medium and high climate sensitivity scenarios

***Human Health Impacts and Costs Thereof***

EPA has reviewed the new section in the FEIS describing an approach to quantify and monetize estimates of health impacts associated with the different fuel economy alternatives. EPA believes that NHTSA's approach is inconsistent with current health impact analyses. As a result, the FEIS presents a lower estimate of benefits, which, in turn, could result in a lower final CAFE standard.

In specific regard to the PM-related human health impact scaling approach, relying upon the *Report to Congress on the Benefits and Cost of the CAA 1990 to 2010* (the Prospective analysis, published in 1999) is problematic for many reasons. A key consideration in any scaling or "benefits transfer" exercise is comparability between the reference scenario and the policy scenario to which it is applied. In this case, the underlying analysis of the benefits and costs of *all* actions associated with the Clean Air Act Amendments of 1990 (CAAA) is very different than the analysis of air quality and health impacts associated with alternative motor vehicle fuel efficiency standards. EPA believes that it is impossible to split out the motor vehicle portion of human health impacts from all emission reduction sources attributed to the Clean Air Act Amendments in 1990 using the approach described in Section 3.3.2.4.2.

The equation on pg. 3-27, when reduced, simply takes the ratio of direct PM emissions associated with the CAFE alternatives to direct PM emissions from all CAAA sources and multiplies that ratio by the estimate of mortality associated with the CAAA.

$Mortality_{CAAA} * (90{,}000/300{,}000) * (PM_{2.5\ A1\text{-}An}/90{,}000) = Mortality_{CAAA} * (PM_{2.5\ A1\text{-}An}/300{,}000) = Mortality_{A1\text{-}An}$

Where:
- In 2010, the CAAA analysis estimated 90,000 tons of direct PM from motor vehicles were reduced,
- In 2010, 300,000 tons of direct PM across all regulated sources were reduced (utilities, point and area sources, nonroad and motor vehicle sources), and
- A1 and An refer to NHTSA's no action scenario and the alternative CAFE scenarios, respectively.

This method of scaling does not tease out the underlying contribution of motor vehicle emissions to improvements in air quality associated with the CAAA.

This approach also does not account for the large contribution NOx- and $SO_2$-related secondary PM formation makes toward total ambient $PM_{2.5}$-related health impacts. The CAAA analysis estimates that in 2010, 11 million tons of NOx, 8 millions tons of $SO_2$, and 300,000 tons of direct $PM_{2.5}$ are reduced as a result of the 1990 amendments. Of those emissions, the CAAA analysis estimates that motor vehicles account for 3.5 million tons of NOx reduced, 360,000 tons of $SO_2$ reduced, and 90,000 tons of direct $PM_{2.5}$ reduced. The magnitude of the CAAA emission reductions across sources, their spatial and temporal distribution, and the complex chemical interactions associated with emissions and ambient PM formation makes the CAAA analysis an inappropriate study from which to extrapolate a source-specific analysis of human health impacts.

An additional concern is that NHTSA's scaling approach does not account for the distribution of PM precursor emissions changes (direct PM, NOx, and $SO_2$) attributed to each CAFE alternative over time, resulting in a significant underestimate of the human health impacts. For example, while the direct PM reductions between NHTSA's CAFE alternatives are relatively modest, the difference between NOx and $SO_2$ reductions are much more dramatic. By relying solely upon direct $PM_{2.5}$ emissions, NHTSA's scaling approach is unable to account for these trends in secondary PM formation.

It is important to also note that EPA has made many methodological improvements to human health impact analyses since the *Report to Congress on the Benefits and Cost of the CAA 1990 to 2010* was published. These updates include, but are not limited to: the use of more recent epidemiological studies, including PM-related mortality; the use of updated mortality incidence rates; and updates to the underlying air quality models and modeling assumptions.

EPA also has substantial issues regarding the economic impacts evaluation for many reasons. The study upon which NHTSA bases its scaling methodology (*EPA/OTAQ 2003, Vehicle miles traveled and the social costs of air pollution*) is out-of-date. The underlying valuation assumptions have been updated and improved since the vintage of that analysis. Furthermore, while we appreciate the attempt to scale ozone-related benefits, EPA does not support the scaling of ozone-related endpoints due to the complex nonlinearities associated with ozone formation. Moreover, NOx emissions should not be split into "PM-related" and "ozone-related" categories. All NOx emissions are accounted for in their relative contribution to PM and ozone formation within air quality models. The NHTSA approach reduced the NOx-related portion of both PM and ozone benefits in half.

The use of the $/ton estimates EPA provided to NHTSA would address some of the above problems. For example, the $/ton estimates incorporate up-to-date assumptions regarding human health impacts and valuation. They also capture the relative contribution of direct PM, NOx and $SO_2$ more accurately than the scaling approach described by NHTSA. It is important to note, however, that $/ton estimates are a "back-of-the-envelope" solution in the absence of a full-scale air quality and health impacts analysis. It is always preferable to conduct photochemical air quality modeling to characterize ambient air quality conditions and to feed this data through population exposure models such as the Environmental Benefits Mapping and Analysis Program (BenMAP). We also note that the PM-related $/ton estimates result in an underestimate of total benefits because they exclude ozone-related impacts and other unquantified endpoints.

It must also be noted that the estimates of CO impacts are inconsistent with those of other pollutants. The CO impact decreases when going from the 2011-2015 scenario (Table VII.G-3) to the full 2011-2020 scenario (Table VII.G-4) (i.e, a lesser reduction in emissions for the full case), while the change for all other pollutants is a substantially increased impact (i.e., a greater reduction in emissions). An explanation for this inconsistency is needed if, in EPA's view, it does not reflect a mathematical error.

***Additional Specific comments*:**

Page 3-79, third paragraph: The statement that the CCSP Scientific Assessment concludes that it is "very unlikely that any abrupt climate change will occur during the 21st century" is a mischaracterization of the report and not supported by any scientific assessment. What the CCSP report does say is: "Greenhouse warming and other human alterations of the Earth system may increase the possibility of large, abrupt, and unwelcome regional or global climatic events." The CCSP assessment does state that a catastrophic shutdown of the Meridional Overturning Circulation is "very unlikely" -- but this does not apply to abrupt climate change broadly. There is no basis (in any available scientific assessment) to make the blanket statement that abrupt climate change (of any kind) is very unlikely to occur in the next 100 years. This also applies to the identical statement in the first sentence of page 4-48.

Page 3-98, first paragraph: The statement that tools are not available to project regional temperature under different emissions scenario is not true. The SCENGEN model (coupled to the MAGICC tool used by NHTSA) -- which is tuned to any/all of the 21 general circulation models used in IPCC, 2007 can provide regional temperature projections for 2.5 x 2.5 lat/long grid cells anywhere around the globe. We do agree with the statement that "the alternatives (scenario) would be expected to reduce the impacts in proportion to the amount of reduction in global mean surface temperature."

Page 3-100: While MAGICC does not project change in global and regional precipitation, SCENGEN could conceivably be applied for this application. Having said that, the scaling method described is defensible.

Page 4-69: EPA questions the use of climate sensitivities of 2.5, 3.0, and 4.5 when the IPCC range is 2.0 to 4.5. This seems particularly problematic when, earlier in the document (see our general comment), NHTSA assumes a climate sensitivity range of 2.5-4, which itself does not reflect the IPCC range. EPA believes the climate sensitivities used should be consistent across your analysis and should reflect the full IPCC range. To reiterate, EPA recommends modeling three sensitivities -- 2.0, 3.0 and, 4.5. If NHTSA should want to choose just two, EPA recommends using the low and high end to bound the analysis... i.e. 2.0 and 4.5

Page 4-143: The second sentence of the second paragraph reads: "In general, uncertainty about the distribution and timing of climate-change impacts at the local level makes judgments about the scale and timing of adaptation actions very difficult (Wilbanks et al. 2007)." Since nothing follows, this could give the false impression that inaction is an appropriate strategy until more detailed climate impact predictions for specific areas are available. On the contrary, it should be noted that following a risk-management approach to adaptation decision-making will enable valuable proactive adaptation actions to be taken even in the face of continuing uncertainty. Additionally, a range of no- and low-regret adaptation actions can often be employed (measures which, even in the absence of climate change impacts, will result in a net benefit or low cost).